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Points of Promise of Mathematical Thinking Behaviors Checklist

Development and Refinement

The goals of Project EAGLE are to: (a) develop a dynamic approach to equitably identify gifted English Learners (ELs) in the familiar context of classroom math instruction; (b) build classroom teachers', gifted specialists', and EL teachers' capacity for fostering and spotting gifted talent; and (c) increase the number of ELs referred for gifted services in Grades 3–5. This approach has shown results for spotting mathematical potential and talent in the EL population and across other underserved populations. A key component of the dynamic approach is using a mathematical thinking behaviors checklist with an open-ended math lesson. Project EAGLE uses the Points of Promise of Mathematical Thinking Behaviors Checklist that researchers developed across Javits Projects BUMP UP (#S206A190028) and EAGLE (#S206A220040).

Project BUMP UP

The first iteration of the Points of Promise checklist was the *Sparks of Math Talent: Classroom Observation Checklist* developed through Javits Project BUMP UP. Project BUMP UP was designed for Gr. 3–5 teachers to upwardly differentiate mathematics by unit. Teachers used with accompanying open-ended math lessons by unit to complement benchmark pre-assessments in finding students ready for upward differentiation.

Researchers drew upon literature and advanced mathematical characteristic checklists (Fairfax County Public Schools n.d.; Gavin, 2011; Pfeiffer and Jarosewich, 2003; Renzulli et al., 2002; Sheffield, 2002) to develop a list of 86 behaviors. A sub-committee of four individually reviewed the items and indicated which they believed were both important. They came to consensus on the importance of 68 items that they grouped into 13 categories. Next the entire research team reviewed the items in those categories to generate a list of 14 behaviors they believed teachers would be able to observe in a classroom lesson and wrote them into statements. They considered cautions from the literature including:

- Characteristics that may be useful in a mathematics class but not necessary for mathematical promise (e.g., speed, memory, and spatial ability; Sheffield, 2002);
- Tasks that preclude spotting mathematical promise (e.g., non-motivating tasks, achievement tests that do not address creativity, limited exposure to opportunities for advanced mathematical thinking; Gavin, 2011); and

- Potential excuses for not developing math talent (e.g., gender-based assumptions about mathematical interest and talent, not scoring 100% on high-stakes tests of computation over conceptual understanding, computational errors; Assouline & Lupkowski-Shoplik, 2010).

Finally, the research team combined four of the behaviors into two statements, establishing the initial *Sparks of Math Talent: Classroom Observation Checklist* of 12 behaviors (see Appendix).

Project BUMP UP teachers successfully found unexpected students, including those from underrepresented populations, in need of differentiation through the Sparks checklist who did not emerge through the benchmark pre-assessments. Based on this success, researchers used the Sparks checklist as the foundation for a revised checklist in Project EAGLE.

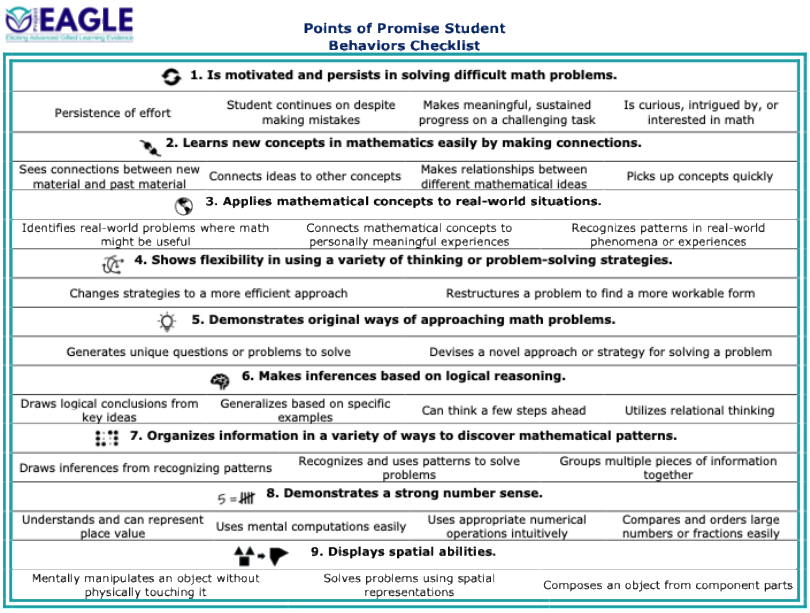
Project EAGLE

In Project BUMP UP, the checklist was a pre-assessment for upward math differentiation by unit. In Project EAGLE, the checklist would now be used to spot mathematical thinking points of promise through classroom instruction, with a focus on English learners. The goal was to spot students who would benefit from being referred for gifted screening who were not already on the teacher's radar.

The Project EAGLE team conducted a further review of literature and worked with an advisory board to refine the Sparks checklist into nine *Points of Promise of Mathematical Thinking Behaviors Checklist* with 2–4 sub-behavior examples for each (see Figure 1).

Figure 1

Points of Promise Student Behaviors Checklist



Note. The sub-behaviors are select examples of each behavior; they are not intended to be an exhaustive list. This is to focus attention on fluidly and flexibly spotting any example of potential.

Revisions based on classroom observations, teacher interviews, and focus groups resulted in the finalized checklist of POPs. These are organized into three categories (connections, creativity, and patterns) to facilitate spotting POPs during math instruction. It is available in teacher and student-friendly language (see Figure 2). Project EAGLE teachers have reported successfully spotting POPs from unexpected students, including ELs who they have subsequently considered referring for gifted screening (n = 33; Sodergren et al., 2026).

Figure 2

Nine Points of Promise in Teacher and Student Language by Category

Nine Points of Promise

Teacher Language	Student Language
1. Is motivated and persists in solving difficult math problems.	1. I enjoy working on math and continuing to try to find the answer even when the problems are difficult.
2. I learn new concepts easily by making connections.	2. I connect what I am learning to what I have learned before in math.
3. Applies mathematical concepts to real-world situations.	3. I relate the math we are learning to everyday life outside of math class.
4. Shows flexibility in using a variety of thinking or problem-solving strategies.	4. I try different strategies to solve math problems.
5. Demonstrates original ways of approaching math problems	5. I think of new ways to solve math problems and new problems to solve.
6. Makes inferences based on logical reasoning.	6. I use logical reasoning...
7. Organizes information in a variety of ways to discover mathematical patterns.	7. I recognize patterns in math and use them to organize information.
8. Demonstrates a strong number sense.	8. I understand and use relationships between numbers to order, compare, and estimate.
9. Displays spatial abilities.	9. I can figure out how shapes fit together in different ways.

[Connections] [--Creativity--] [-------Patterns-------]

Note. The student language POPs are also available in a reproducible poster with accompanying icons.

References

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Appendix

Literature-Based Behaviors	Behavioral Statements	Observation Items for Spotting Math Talent and Potential	Sparks of Math Talent	Points of Promise	"I am thinking mathematically when I..."
Eagerness/ Interest/Motivation	Shows motivation to solve math challenges or problems.	Shows motivation to solve math challenges or problems.	Is motivated and persists in solving difficult math problems.	**1. Is motivated and persists in solving difficult math problems.**	**1. I enjoy working on math and continuing to try to find the answer even when the problems are difficult.**
Demonstrates Persistence	Persists in solving difficult math problems.	Persists in solving difficult math problems.			
Demonstrates Facility in Learning and Strong Understanding	Learns new information in mathematics quickly.	Learns new information in mathematics quickly.	Learns new concepts in mathematics quickly.	**2. I learn new concepts easily by making connections.**	**2. I connect what I am learning to what I have learned before in math.**
	Applies mathematical concepts to real-world situations.	Applies mathematical concepts to real-world situations.	Applies mathematical concepts to real-world situations.	**3. Applies mathematical concepts to real-world situations.**	**3. I relate the math we are learning to everyday life outside of math class.**
Demonstrates Flexibility	Shows flexibility in using a variety of thinking and problem solving strategies.	Shows flexibility in using a variety of thinking and problem-solving strategies.	Shows flexibility in using a variety of thinking and problem-solving strategies.	**4. Shows flexibility in using a variety of thinking or problem-solving strategies.**	**4. I try different strategies to solve math problems.**
Demonstrates creativity/innovation	Demonstrates creative ways of approaching math problems.	Demonstrates creative ways of approaching math problems.	Demonstrates creative ways of approaching math problems.	**5. Demonstrates original ways of approaching math problems**	**5. I think of new ways to solve math problems and new problems to solve.**
Initiates, Elaborates, Questions	Asks complex questions to explore mathematical concepts.	Asks complex questions to explore mathematical concepts.	Asks complex questions to explore mathematical concepts.		
Demonstrates Reasoning and Problem Solving	Makes logical inferences based on sound reasoning.	Makes logical inferences based on sound reasoning.	Makes inferences based on logical reasoning.	**6. Makes inferences based on logical reasoning.**	**6. I use logical reasoning...**
Demonstrates Intuition	Is insightful or intuitive in understanding or solving problems.				
Organization	Organizes data and information in a variety of ways to discover mathematical patterns.	Organizes data and information in a variety of ways to discover mathematical patterns.	Organizes data and information in a variety of ways to discover mathematical patterns.	**7. Organizes information in a variety of ways to discover mathematical patterns.**	**7. I recognize patterns in math and use them to organize information.**
Perceives Patterns	Recognizes patterns in mathematical data.	Recognizes patterns in mathematical data.	Recognizes patterns in mathematical data.		
	Organizes data into mathematical patterns.	Organizes data into mathematical patterns.			
Demonstrates Number Sense	Demonstrates a strong number sense (e.g., makes sense of numbers, estimates easily and appropriately).	Demonstrates a strong number sense (e.g., makes sense of numbers, estimates easily and appropriately).	Demonstrates a strong number sense (e.g., makes sense of numbers, estimates easily and appropriately).	**8. Demonstrates a strong number sense.**	**8. I understand and use relationships between numbers to order, compare, and estimate.**
Demonstrates Spatial Abilities	Displays spatial abilities.	Displays spatial abilities.	Displays spatial abilities.	**9. Displays spatial abilities.**	**9. I can figure out how shapes fit together in different ways.**
Capable of Abstraction	Demonstrates understanding of abstract concepts without the need for concrete materials.	Demonstrates understanding of abstract concepts without the need for concrete materials.	Demonstrates understanding of abstract concepts without the need for concrete materials.	*Removed as the use of manipulatives was determined to be an important Structured English Immersion non-verbal means for students to convey mathematical thinking.*	